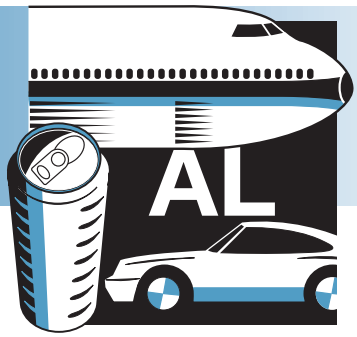
ALUMINUM

Project Fact Sheet



Detection and Removal of Molten Salts from Molten Aluminum Alloys

Benefits

- Improved metal quality, recovery, and reliability
- Elimination of melt rejection and recast due to salt contamination, with a potential annual energy savings of 0.04 trillion British thermal units (Btu)
- Estimated reduction in chlorine use and release of about 71,000 cubic feet per year

Applications

The successful demonstration of this project will help the aluminum casting sector improve metal quality through the detection and removal of impurities and inclusions from molten aluminum.

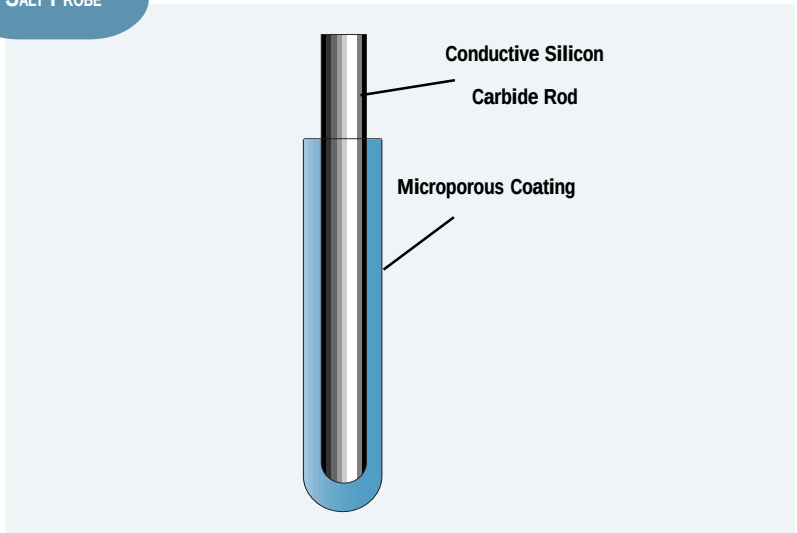
New probe and filter will improve metal quality through detection and removal of impurities

Selee Corporation and the Alcoa Technical Center are conducting a program to detect and reduce chloride salts in molten aluminum. These salts have been shown to initiate defects when they agglomerate and migrate to the surface of an ingot or casting. Because they are liquid at aluminum casting temperatures, they can pass through conventional filter systems, which are designed to capture solid inclusions. Moreover, they tend to reduce the efficiency of filters by causing the release of solid inclusions.

Selee Corporation has invented a simple electrical probe that senses the presence of salts in molten aluminum. Although consistent results have been seen in laboratory and plant tests, this salt detector needs to be calibrated. That is, its response must be correlated to the specific level of salts in the metal so that the response can be accurately interpreted. Selee has also invented a filter which selectively removes liquid salts from the liquid metal. This has been demonstrated in laboratory tests, but tests in real casting conditions must be carried out to determine efficiency and capacity of the filter.

Research needs identified in the *Aluminum Industry Technology Roadmap* addressed by this project include improved metal quality, increased reliability of manufacturer operations up to 95 percent, and real-time measurement of molten metal composition.

Salt Probe



Microporous coating not wetted by metal wetted salt.

Project Description

Goal: Develop and demonstrate the technology at commercial-scale in one year.

Using the experimental casting facility at the Alcoa Technical Center, the two devices--the sensor probe and the filter--will be exposed to various levels of chlorine and metal flow rates using commercial alloys. Alcoa will analyze melt inclusions using a LIMCA II instrument, and Selee will characterize the melt using a vacuum filtration technique to provide metal cleanliness data. In addition, samples of the melt will be collected and analyzed to provide an independent determination of the chlorine level. In this way, the response of the probe will be correlated with chlorine levels over a wide range of conditions. At the same time, the efficiency of the salt filter will be assessed. By monitoring the efficiency of the filter as a function of chlorine and time in casting, the adsorptive capacity of filter media can be determined.

Progress and Milestones

- Completed first set of experimental trials of the filter and sensor probe at the Alcoa Technical Center in early Fall 1998.
- Conducting second set of experimental trials of the filter and sensor probe at the Alcoa Technical Center. Completion of trials is expected by early Summer 1999.

Commercialization Plan

Selee Corporation will begin marketing the sensor probe and filter immediately after successful completion of the project. Commercial implementation by the domestic aluminum industry should be realized soon after, probably within another year.

Project Partners

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Alcoa Technical Center
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Selee Corporation
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